TABLE 1.—*The computed regimen of the Great Lakes.*

(1) LAKE SUPERIOR.

1.	Area of watershed, square miles	48,600	.....
2.	Area of water surface, square miles	31,800	.....
3.	Factor: Watershed / lake surface	1.528	.....
4.	Annual rainfall on watershed, inches	31.2	.....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	7.8	15.6
7.	Equivalent depth on lake surface, inches	11.9	23.9
8.	Annual rainfall on lake surface, inches	31.2	31.2
9.	Annual inflow in depth, inches	0.0	0.0
10.	Total supply in depth, inches	43.1	55.1
11.	Annual evaporation in depth, inches	15.0	15.0
12.	Available surplus, inches	28.1	40.0
13.	Measured outflow, inches	36.7	.....
14.	Ratio: Outflow / surplus	1.31	.....

(2) LAKE MICHIGAN.

1.	Area of watershed, square miles	45,700	.....
2.	Area of water surface, square miles	22,400	.....
3.	Factor: Watershed / lake surface	2.040	.....
4.	Annual rainfall on watershed, inches	33.6	.....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	8.4	16.8
7.	Equivalent depth on lake surface, inches	17.1	34.3
8.	Annual rainfall on lake surface, inches	33.6	33.6
9.	Annual inflow in depth, inches	0.0	0.0
10.	Total supply in depth, inches	50.7	67.9
11.	Annual evaporation in depth, inches	21.6	21.6
12.	Available surplus, inches	29.1	46.3
13.	Measured outflow. inches	....	.....
14.	Ratio: Outflow / surplus	....	.....

(2)+(3) LAKE MICHIGAN PLUS HURON.

1.	Area of watershed, square miles	97,800	.....
2.	Area of water surface, square miles	45,600	.....
3.	Factor: Watershed / lake surface	2.145	.....
4.	Annual rainfall on watershed, inches	33.6	.....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	8.4	16.8
7.	Equivalent depth on lake surface	18.0	36.0
8.	Annual rainfall on lake surface, inches	33.6	33.6
9.	Annual inflow in depth, inches	18.75	27,9
10.	Total supply in depth, inches	70.35	97.5
11.	Annual evaporation in depth, inches	21.6	21.6
12.	Available surplus, inches	48.75	75.9
13.	Measured outflow, inches	67.02	.....
14.	Ratio: Outflow / surplus	1.38	.....

(2)+(3)+(4) LAKE MICHIGAN PLUS HURON PLUS ST. CLAIR.

1.	Area of watershed, square miles	104,190	.....
2.	Area of water surface, square miles	46,095	.....
3.	Factor: Watershed / lake surface	2.259	....
4.	Annual rainfall on watershed, inches	34.0	.....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	8.5	17.0
7.	Equivalent depth on lake surface, inches	19.20	38.3
8.	Annual rainfall on lake surface, inches	34.0	34.0
9.	Annual inflow in depth, inches	19.5	27.9
10.	Total supply in depth, inches	72.7	100.2
11.	Annual evaporation in depth, inches	21.7	21.7
12.	Available surplus, inches	51.0	78.5
13.	Measured outflow, inches	67.0	.....
14.	Ratio: Outflow / surplus	1.31	.....

(5) LAKE ERIE.

1.	Area of watershed, square miles	24,480	.....
2.	Area of water surface, square miles	10,000	.....
3.	Factor: Watershed / lake surface	2.448	.....
4.	Annual rainfall on watershed, inches	37.2	.....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	9.3	18.6
7.	Equivalent depth on lake surface, inches	22.8	45.6
8.	Annual rainfall on lake surface, inches	37.2	37.2
9.	Annual inflow in depth, inches	235.1	406.0
10.	Total supply in depth, inches	295.1	488.8
11.	Annual evaporation in depth, inches	24.0	24.0
12.	Available surplus, inches	271.1	464.4
13.	Measured outflow, inches	339.6	.....
14.	Ratio: Outflow / surplus	1.31	.....

(6) LAKE ONTARIO.

1.	Area of watershed, square miles	25,530	.....
2.	Area of water surface, square miles	7,450	.....
3.	Factor: Watershed / lake surface	3.427	.....
4.	Annual rainfall on watershed, inches	33.6	....
5.	Average run off, percentage	25.0	50.0
6.	Equivalent depth on watershed, inches	8.4	16.8
7.	Equivalent depth on lake surface, inches	29.2	58.4
8.	Annual rainfall on lake surface, inches	33.6	33.6
9.	Annual inflow in depth, inches	364.0	620.3
10.	Total supply in depth, inches	426.8	712.3
11.	Annual evaporation in depth, inches	24.0	24.0
12.	Available surplus, inches	402.8	688.3
13.	Measured outflow, inches	547.0	.....
14.	Ratio: Outflow / surplus	1.392	.....

MOUNTAIN STATIONS IN AUSTRALIA.

The following extract from a letter addressed to the Chief of the Weather Bureau, by Clement L. Wragge, Government Meteorologist, Brisbane, Queensland, Australia, dated February 7, 1898, shows that mountain meteorology is not to be confined to the Northern Hemisphere and the great continents, but will be prosecuted wherever mountain peaks can be found. We also infer that the Australian stations on Mount Wellington and Mount Kosciusko represent a general attack upon the problem of upper currents in which the whole of Australia, and not merely any one district, is interested. Indeed, for that matter, the whole Northern Hemisphere is interested in what goes on in the upper regions of the Southern Hemisphere, and we wish every success to Mr. Wragge's enterprise and to all similar efforts:

I have much pleasure in informing you that, on the 9th of December last, I established an experimental meteorological observatory on Mount Kosciusko, 7,328 feet, the highest mountain in New South Wales; and by January 1, a similar station correlative thereto was also established near the sea level at Merimbula, in New South Wales. Simultaneous observations are taken at both stations every four hours, commencing at midnight; and also, as a special series, half-hourly, between 8 a. m. and noon, on the original Ben Nevis lines. Simultaneous readings are also taken at Sale, in Victoria, near the sea level, and also at a special station established by me in the city of Sydney. Simultaneous observations are further taken (with the exception of those at the half-hours) at Hobart, on the summit of Mount Wellington, and at the Half-way Station. I sincerely trust that the results will prove of value to meteorology.

The principal donors to the Kosciusko scheme are Mr. Barr-Smith, of Adelaide, and the Honorable G. H. Reid, premier of New South Wales, as representing the New South Wales Government.

I hope to be able to make arrangements for the continuation of the mountain station during the winter months, but am not, as yet, quite sure on that point. At any rate, the Kosciusko experiment will be repeated at the close of the coming winter. You will see full accounts by the various newspapers which you will receive in due course, and this letter must be taken as my official intimation.

TIN ROOFS AS LIGHTNING CONDUCTORS.

A recent letter from Dr. John W. Kales, of Franklinville, N. Y., describes a terrific thunderstorm at that place on May 19, on which occasion several persons within houses were more or less affected. A boy reported a ball of lightning, or fire, passing down his limbs; his hand, in contact with an iron sink, was scorched, showing how large a proportion of the discharge passed through him to the city water main, although he was 200 feet distant from the central electric discharge.

The electrician of the Weather Bureau (Mr. J. H. Robinson) informs us that in all his experience a house with a tin roof was never injured by lightning; he considers that a house having a tin or metal roof, connected by one or more rain spouts to the ground, is a much safer protector against lightning than the ordinary lightning rod. The great surface of the roof allows the electric discharge to diffuse in all directions and diminishes the chance of fire or death.

The Editor would be glad to receive from each of his readers a statement as to the statistics of relative damage done when flashes strike houses or barns having shingle, slate, or tin roofs. His own impression is that buildings in cities, which are usually covered with tin, are quite as apt to suffer as buildings in the country covered with shingles, slates, or tiles, and that buildings without lightning rods suffer more than those of the same kind with lightning rods.

It has been satisfactorily shown that an object placed within a metallic inclosure is entirely unaffected by any electric current that passes through the metallic covering, as the latter conducts the electricity around it. On this principle, important buildings have been protected by a network of wires and rods. In so far as a tin roof more or less completely incloses a building it affords similar protection; but as a severe flash would probably melt the soldered joints, and even the sheet-iron itself, we think it would be cheaper to use lightning rods to protect the tin roof from destruction.

The German insurance companies distinguish between "cold strokes," that do not set fire to buildings, and "hot strokes," that do produce conflagrations. Is the difference due to the flash or to the object that it strikes, or is it simply a question of the ratio between the intensity of the electric discharge and the conducting power, or the resistance, of the object through which the electricity must pass in order to reach the ground?

TEMPERATURE OF LAKE WATER.

The temperature of the water in quiet lakes and ponds must, in general, be colder in the winter season than in the summer. Of course the colder, denser water will sink to the bottom as the autumn and winter advance.

If the surface temperatures go down to 39° F. the surface water must sink to the bottom, and the lowest water must come up on account of its buoyancy. The measurement of temperatures at various depths in a lake will show when this interchange of top and bottom water is about to take place, and is, therefore, a matter of importance to the engineers in charge of the water supply of large cities, as well as to those engaged in the business of cutting ice. Of course there can be no formation of ice at the surface of still water until after this vertical interchange has taken place, and the temperature of 39° prevails throughout the lower part of the pond. In rapidly running water the conditions are somewhat different.

The measurement of temperatures at any depth is easily accomplished by means of some form of electric thermometer. The "Thermophone" of Warren and Whipple is peculiarly adapted to this work. Measurements of this kind were made on July 1, 1896, in Clear Lake, Lepreau Township, southwestern New Brunswick, by Prof. W. F. Ganong, and are published in the Bulletin of the New Brunswick Natural History Society. This lake is about one-third of a mile long and one-sixth of a mile broad, and its maximum depth is 78 feet, which is very deep for so small a lake. The temperatures observed at 11 different points showed that the water was very uniformly stratified as to temperature and density, as might be expected from the fact that its outflow is very slight. The average result gives the accompanying table of temperatures and depths:

Depth.	Average temperature.	Depth.	Average temperature.	Depth.	Average temperature.
Feet.	°	*Feet.*	°	*Feet.*	°
3	65	30	47.6	57	43.0
6	65	33	46.2	60	42.6
9	65	36	45.0	63	42.5
12	65	39	44.3	66	42.5
15	64.7	42	44.1	69	42.5
18	63.9	45	43.6	72	42.5
21	59.2	48	43.5	75	....
24	54.7	51	43.0	78	....
27	50.7	54	43.0		

Although the last two depths were not measured, yet it is evident that they are not likely to have been less than 42.0°.

Mr. Ganong concludes that down to a depth of 12 feet the diurnal effect of solar heat is appreciable, and that the surface movements of the water, such as the waves due to the wind, help to distribute this heat uniformly; that below 18 feet the layers of water derive their temperatures by conduction from those above them.

Mr. Ganong also says that at depths below 30 feet the temperature is slightly higher at any given depth over shallower places than over deeper ones, indicating that the ground warms the water in contact with it, which is to be expected since it is a better conductor of heat; but this is a very slight matter, and, in general, the temperature depends on the depth from the surface and not on the height above the bottom.

As these observations were made on only one day in midsummer, they can give us no information as to the changes in temperature of the whole pond with the season, not even its changes with the hour of the day, although undoubtedly the measurements made occupied the greater part of the day. The temperature of the air at the surface of the lake in the morning was 71° F., or 6° higher than the temperature of the surface of the water.

METEOROLOGY OF THE SECOND WELLMANN EXPEDITION.

The first Wellmann expedition sought to reach the North Pole in 1894 by way of Spitzbergen. It left Tromsoe May 1, and reached Dane's Island May 7. After a long struggle near Spitzbergen, attaining latitude 80° 37′ N., it returned to Tromsoe, August 15. Mr. H. H. Alme, of the Meteorological Office at Christiania, Norway, accompanied the expedition as meteorologist and physicist, but Mr. Owen B. French, of the Coast and Geodetic Survey, Washington, was in charge of all the scientific work, and personally officiated as astronomer and geodesist. The meteorological records kept by Mr. Alme were reduced by him and forwarded to Washington through Professor Mohn, but so far as we know they have not yet been published. On account of the daily movements of the observer the principal value of such records is its use as a means to fill up the daily weather map for distant portions of the globe. Now that Mr. Wellmann has organized the second arctic expedition, via Franz Josef Land, the Weather Bureau has given Mr. E. B. Baldwin, observer, a furlough, in order that he may volunteer his services as meteorologist. Of course, the law providing for the Weather Bureau does not contemplate arctic exploration, or the pursuit of meteorology beyond the bounds of the United States, therefore, Mr. Baldwin must go without compensation from the Government.

The study of climatology is generally considered as an extremely local problem but the study of meteorology can never be so. The meteorologist must take in the whole atmosphere, horizontally and vertically, and our science is to